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ABSTRACT

The quality of education received by children in the southern states will be greatly impacted by technological change, which will present educators with both unprecedented opportunities and substantial risks. As the four model programs described in this paper illustrate, advances in telecommunications and computer hardware and software can be used to great advantage by school systems. Through telecommunications technology, students in five rural high schools in North Carolina have recently completed a course in applied physics and vocational education that had never been offered in their schools before; three low income, predominantly minority middle schools in Mobile, Alabama, eastern rural North Carolina, and downtown Atlanta, Georgia, are participating in Project MICRO, a program designed to overcome disparities in access to computers; special needs students in Louisiana can use specially adapted microcomputers to improve their leisure and learning skills and boost their self-esteem; and the computer literacy program in Houston, Texas, emphasizes access to microcomputers and training in their use for minority and low income students and their families. On the risk side, introducing technology into the classroom can be costly, alienate teaching staff, and widen the gap between advantaged and disadvantaged students. The development of effective curricula relying on the new technologies can benefit the entire community, while careful long-range planning can prevent the negative outcomes noted above. (DJR)

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Foresight
MODEL PROGRAMS FOR SOUTHERN ECONOMIC DEVELOPMENT

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TOOLS FOR TOMORROW
EDUCATIONAL TECHNOLOGY IN SOUTHERN CLASSROOMS

INTRODUCTION

In an increasingly competitive, global economy, the quality of education received by the children of the South will be one of the most critical factors in the region's ability to achieve and maintain an adequate standard of living for all of its people. Technological innovations are changing the skill requirements for all types of jobs, and school systems are beginning to respond to these changes. They are introducing microcomputers into the classroom, not merely to teach basic math, science, and reading skills, but to expose students to the problem solving applications these powerful tools provide. Microcomputers, electronic blackboards, teleconferencing, and live satellite transmission have the potential to transform Southern classrooms into more effective laboratories for learning the concepts and skills that will prepare students for the workplaces of the future.

Technology provides new opportunities for improving the quality of education for all students. But for students with special needs, the prospects are especially exciting. Technology can open up educational possibilities for students in remote rural areas, for handicapped students, and for students from low income families. Distance learning, where specialized classes are transmitted via satellite to remote school districts, provides instruction in subjects such as foreign language, physics, or political science, which would not otherwise be available due to teacher shortages and the small number of students enrolled in such classes. Educational technology also holds promise for handicapped students, who can use computer assisted instruction programs to learn at their own pace, and receive immediate rewards for each improvement they make. School systems which reach out to low income parents (providing them with instruction in computer use and lending computers for home use) build relationships between parent and school and parent and child. These interactions are likely to have a positive effect on the student's overall performance in school.

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Like most widely proclaimed panaceas, however, technology in the classroom is not the answer to all of the problems facing education in the South. In fact, if improperly used, technological innovations can exacerbate inequalities in the schools, damage teacher morale, and give a false sense of security to parents and the local community that their children's curricula are adequately preparing them for the future.

In the past, various breakthroughs in educational technology such as language labs, closed circuit television, and movie projectors have been introduced into the public schools. All have yielded less than the anticipated results. Many teachers, inadequately trained in the most productive use of the new machines, ignored them in favor of more familiar practices, or used them as "babysitters" rather than integrating them fully into their teaching methods and curricula. There is evidence to suggest that microcomputers, which have been purchased by school systems at a steadily increasing rate over the past five years, could meet a similar fate unless a number of important issues are addressed.

Between 1983 and 1985, the number of computers in use in the nation's public schools quadrupled from about 250,000 to over one million. Ninety percent of United States school students now attend schools with a least one computer.[1] In their rush to keep pace with the introduction of technology in the workplace, parents as well as school administrators have shown a fascination with hardware, purchasing microcomputers and setting up computer labs. Too little attention has been paid to software and the instructional environment in which the computers are used.

Although excellent instructional software exists, the overall quality is uneven. Teachers often have neither the expertise nor the time to review and evaluate the wide range of existing programs. Nor are most teachers trained in the most productive use of pedagogical software. In fact, teachers may reject the best programs because they involve group activities and a high noise level, or because they present concepts and raise questions in areas the teacher is not prepared to cover.

To facilitate the selection of software and promote its effective integration into the curriculum, some school systems, most notably the Houston Instructional School District, have established centralized resource centers to evaluate and purchase software. The Houston Department of Technology also provides intensive training programs for teachers, and has created a teacher technologist position at each campus to give on-site assistance to teachers and parents.

Another critical issue which school systems must address, especially in the South, is that of access and equity. The ratio of microcomputers to students is lower in the South than in the rest of the nation, and the number of poor and minority students is higher. According to a recent

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[1] "Instructional Uses of School Computers-Reports from the 1985 National Survey," The Johns Hopkins University Center for Social Organization of Schools, June 1986, p. 1.

report to the Secretary of Education, "poor school districts in remote rural areas and some urban neighborhoods lack the means to provide equal access for each student." In 1984, schools with less than five percent of their students below the poverty level had, on average, one microcomputer for every 54 students. Schools with 25 percent of their students below the poverty level had one computer for every 73 students. Poor, minority school districts, already struggling to provide an adequate education to their students, risk falling further behind more affluent school districts in providing their students with access to technology. Girls, racial minorities, and low-income students are well represented in classes that use computers for drill and practice or word processing, but are under represented in classes which teach programming skills or use computers as tools to develop writing or other skills, such as statistical analysis.

Teaching students to use computers as tools for writing and analysis, is, according to a number of educational experts, the best way to prepare students for the jobs of the future. Yet, if computer use in the schools is to go beyond drill and practice, or Computer-Assisted Instruction programs, students will need to do better than the 48 minutes per week an average high school student in the South (in 1982-83) uses the computer. Poor school systems will be hard pressed to provide an adequate number of machines and trained teachers to facilitate this kind of learning.

This issue of Foresight examines four models of the use of educational technology in Southern schools. Each program addresses a specific need within the school district through the use of microcomputers or distance learning technologies. Each attempts to improve the cognitive and conceptual skills of its students in preparation for future training and employment in the highly competitive, changing economic environment facing the Southern workforce.

The Down East Instructional Telecommunications Network uses teleconferencing and microcomputers to introduce vocational students in five rural high schools in North Carolina to the concepts of physics. Project MiCRO trains teachers and parents in three predominantly minority middle schools to teach low income students to use microcomputers as tools for problem solving. Special School District #1 in Louisiana adapts hardware and software to make computer assisted instruction and recreational software available to physically and emotionally handicapped students. And the Houston Independent School District, through its Department of Technology, is committed to achieving computer literacy for all of its students through a comprehensive, district wide plan that includes extensive teacher training, parent involvement, and software evaluation and development.

MODEL PROGRAMS

North Carolina--Technology Brings Physics Classes to Remote High Schools

One of the biggest challenges facing vocational education today is finding ways to prepare youth for the complexity of the workplace. A major complaint is that vocational students have not been exposed to enough math, science, and other basic skills. Fewer than two percent of vocational

education graduates in 1982 had taken any physics course. Five high schools in two school districts in North Carolina have developed an innovative way to combine the teaching of physics with vocational education. And, it is happening in two poor, rural districts, Beaufort and Hyde Counties. These counties in northeastern North Carolina are rural counties which have not shared in the prosperity of their more urban counterparts in the state's fast growing Piedmont region. The population of both counties is roughly one-third minority. Hyde County is one of the poorest counties in the state, with an estimated 1983 poverty rate of 31 percent. About 24 percent of Beaufort County residents have incomes below the poverty rate, compared to the statewide average of 17 percent. Students in five high schools in these two counties do not enjoy the resources available in more affluent communities. Because of their remote locations, these school districts also have difficulty attracting qualified teachers, especially in the fields of math and science.

As a result of a cooperatively developed program designed to overcome some of the resource limitations facing teachers and administrators in these rural districts, students in five high schools recently completed a course in applied physics and vocational education which had never been offered in their schools before. In order to offer students a more rigorous vocational education curriculum which includes applied physics, the Division of Vocational Education in the North Carolina Department of Public Instruction, the Rural Education Institute of East Carolina University, and the two local school districts collaborated to produce a technologically innovative program which could not have been offered individually by any of the five schools.

The Downeast Instructional Telecommunications Network (DITN) links each of the five schools with audio conferencing equipment, electronic chalkboards, computers with modems, and a mobile lab. A master teacher coordinates the curriculum, the lab activities, and the teleconferencing using a local state college, East Carolina University, as his home base. Teachers at each of the five schools provide follow-up demonstrations and teach mini-lessons through the teleconferencing system.

Funded by the federal government through the Carl Perkins Vocational Education Act, the program has a $250,000 budget over a three year period. In its first year, this innovative program cost $175,000, primarily for purchase of equipment. Thus far, it has been enthusiastically received by both students and teachers. The curriculum was developed by a consortium of state and local vocational education agencies, the Agency for Instructional Technology (AIT), and the Center for Occupational Research and Development (CORD). It was designed to increase the skills these students will need to compete in the job market by teaching technical principles and concepts, improving math and science skills, providing hands-on laboratory experience, and improving writing, verbal, and personal communications skills. A range of instructional methods are used, including audio and video presentations, traditional lectures, hands-on lab experience, computer simulations, and community resources.

The program technology is an interactive telecommunications system capable of receiving and transmitting instructional programs. The interactive components are the electronic chalkboard, which allows students

or teacher to transmit written signals to the other sites, and an audio link, which allows students and teachers to communicate by voice. The master teacher presents a lesson and accompanying lab via this interactive system. Teachers in the five schools, each of whom has completed 50 hours of training on teleconferencing, curriculum development, and classroom management (in addition to continuing on-site training), provide follow-up lessons and demonstrations.

As a part of their course requirements, the 87 students who were enrolled in the Principles of Technology course worked in teams to solve technological problems facing their local communities. Students at Okracoke High School decided to tackle the periodic flooding of the main road on the small island where it is located. Through letters to state and local officials, academics at the state's major universities, and policymakers, they sought opinions from a range of experts on how best to solve the problem. In preparing their team report, the students faced the challenging task of synthesizing the varying opinions and their own newly acquired knowledge into a final group recommendation. This project gave students a sense of how, working cooperatively, they can apply their "school learning" to solve problems in their community.

A very important aspect of this program is the interaction among students and teachers, and among the teachers themselves. All communicate daily through the interactive telephone system, and teachers meet every other week to plan the demonstrations for the Principles of Technology course. Teachers, in preliminary evaluations, felt that students showed "significant achievement" as a result of this program, greatly improving their listening and diction skills as well as their understanding of the concepts of physics. The teachers themselves noticed dramatic improvement in their own teaching techniques as a result of preparing mini-lessons which supplemented the presentations made by the master teacher.

The Downeast Instructional Telecommunications Network model allows remote, poor school districts to collaborate in the use of technology to offer students a challenging curriculum which none alone would have the resources to provide. This model program familiarizes students with the use of computers and teleconferencing equipment, exposing them, many for the first time, to new technologies. Beyond this exposure, however, the carefully developed curriculum also attempts to teach analytical, problem solving skills that will serve these vocational students well as they seek employment in the future.

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Mobile, Alabama -- Access to Microcomputers for Minority Students

Project MiCRO is a program that attempts to overcome disparities in access to computers in three low income, predominantly minority middle schools in the South. It is a three-year cooperative effort between the Southern Coalition for Educational Equity (SCEE) and the three participating schools--Pantego Junior High in rural eastern North Carolina, Austin T. Walden Middle School in downtown Atlanta, and the Paul Lawrence Dunbar Middle School in downtown Mobile. The local school system provides the computer hardware and software, and release time for teacher training. The Southern Coalition provides a parent coordinator and on-site trainer at each school.

Project MiCRO is designed to take students well beyond the typical practice exercises which tend to dominate elementary and middle school use of microcomputers. "Inequity in educational computing is qualitative as well as quantitative," according to the project's developers. Affluent students, particularly boys, are more likely to learn to use the computer as a problem solving tool. They learn that they, not the machine, are in control. For students exposed only to drill and practice use of computers, however, the locus of control lies with the computer, making the student a passive user.

Project MiCRO has developed its own definition of computer literacy- "the ability of the learner to use the microcomputer to extend his or her information base to solve problems and make decisions." Students learn to use microcomputers the way that managers in business and science do, developing data bases and using spreadsheets to determine interrelationships among variables and to hypothesize alternative outcomes.

Teacher training is an integral part of Project MiCRO's design. Initial training sessions for all teachers emphasize the integration of curriculum objectives in each subject area with word processing, data base management, spreadsheets, and simulation activities. SCEE instructors show teachers how to adapt software to the needs of their students, and how to manage the classroom more efficiently. Follow-up training is provided throughout the school year through on-site visits. Individualized instruction is provided for teachers, especially those experiencing "computer anxiety." Part of this training specifically addresses the issue of gender differences in computer use. Teachers are made aware of ways to encourage their female students to be as active computer users as the male students.

To develop in-house expertise in computer use, a team consisting of several teachers and the principal is selected by the project and school staff. This "master team" gradually assumes responsibility for training new teachers, assessing staff development needs, and monitoring the quality of the project. Thus the need for an SCEE funded instructor is phased out over the three year life of the project.

Another critical element of the project's design is its unique approach to parent involvement. A parent coordinator at each school site holds an open house to introduce the project to the community. Parents are then

offered training in microcomputer use in exchange for volunteering in the school's classrooms. According to Project MiCRO director Carol Edwards, "the involvement of parents in the computer laboratory is a source of motivation and pride for both students and parents," providing for some parents their first pos'tive interaction with their child's school.

The Paul Dunbar Middle School in Mobile, Alabama is the most recent of the three participating schools to begin implementing Project MiCRO. The student body of this inner-city school is comprised of 454 students; all are black, 98 percent qualify for free lunches, 94 percent are from broken homes, and 65 percent live in subsidized housing.

Frank Coleman, principal at Dunbar, indicated that in its first year, the project was successful in attracting the interest of parents, but has lagged somewhat in facilitating teacher training. Sandra Hayes, Dunbar's parent coordinator, has contacted 125 parents, mainly to discuss their children's inclusion in the analytic skills initiative, a course designed to teach students to improve their analytical thinking abilities. She visited 72 parents in their homes, and 45 parents in turn have visited the school to become familiar with using the microcomputers. According to Mr. Coleman, this level of parent involvement is unprecedented in his school.

Although a trainer held individual sessions with every teacher on staff at Dunbar, there were only seven site visits during the school year, and there was a limited amount of release time for teacher training. Mr. Coleman felt that teachers would have benefited had more time been spent on staff development during the course of the year.

New course offerings resulting from the Project MiCRO initiative include a computer literacy course for sixth graders, computer programming classes for seventh and eight graders, and a "Critical Thinking Skills" class offered to 100 seventh and eighth graders. This course is based on the assumption that analytical thinking is a learned behavior, and that all students, regardless of background or achievement level, can improve their critical thinking skills. Some of the skills students are expected to acquire include observation, recall, inference, induction, and deduction.

Because Project MiCRO is in the early stages of implementation, no formal evaluation has yet been completed. However, the project is intended to be replicable; documentation and ongoing, informal evaluation procedures are an important part of the program's design. According to Mr. Coleman, the project thus far has been a "tremendous success" in terms of student, teacher, and parent response. Results of evaluations using control groups in comparable schools will indicate how successful the program has been in introducing "the highest and best uses of microcomputers to minority students" in the South.

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Louisiana--Computer Assisted Instruction for Special Needs Students

Louisiana's Special School District #1, a statewide school system that serves institutionalized special needs students, initiated a program in 1983 that uses computer assisted instruction (CAI) to remove learning barriers for both emotionally disturbed and physically handicapped students. The Louisiana system first used computers to manage the administrative and reporting requirements which often overwhelm special education teachers. The computer-based management system now in effect has minimized the time teachers must spend on administrative duties, allowing many to begin exploring the use of computer applications in the special needs classroom. Currently, 15 of the special district's 24 schools are using computer assisted instruction to reach approximately 500 students. Each school has only two to three microcomputers, but classroom size is small (five to seven students) and student-teacher ratios average seven to one. Thus each student receives individualized attention during computer sessions. John Guilbeau, Director of the CAI program, anticipates that the District will add twenty more microcomputers, plus software and adaptive devices, in the next academic year, at a cost of $50,000 - $70,000. The CAI program is funded almost entirely through federal funds appropriated under Public Laws 94-142 and 89-313.

At the Greenwell Springs Hospital School, adolescents aged eleven to seventeen receive treatment for behavior and drug and alcohol abuse problems. Students' level of academic ability ranges from mild mental retardation to above average--most students have low average to average academic abilities. Seventy students are enrolled in the Special School District #1 program, each with access to one of the three computers which are rotated among ten teachers. The computers are used in the classroom for drill and practice and tutorial exercises in English, Math, Reading, Social Studies, Agriculture, and Art.

According to principal Rose Norman, the teachers are "committed to the value of computers in the classroom." Particularly for emotionally disturbed students, computer assisted instruction is non-threatening, providing positive reinforcement to young people who lack self-confidence in their academic abilities. According to Norman, "as a whole, the students love the computer and look forward to their computer time." Teachers have noted increases in attendance, in ability to follow written direction, and in willingness to finish assignments on time.

The Northwest Louisiana State School in Bossier serves severe and profoundly handicapped students. The staff has identified twenty to thirty students who would benefit from computer assisted instruction to develop both instructional and leisure time skills. These students use special adaptive devices that make computer technology accessible in spite of physical and learning disabilities. An Adapted Firmware Card allows students to slow the speed at which material is presented on the screen. The Card also allows adaptive switches to be used with the software, which means students can have longer response time. The expanded keyboard, which fits easily on a wheelchair or table, is programmed to allow visually impaired students or those lacking fine motor skills to use a reduced number of larger keys to respond to the instructional or recreational software. A speech synthesizer, or voice box for the software, is used with blind students and those students unable to read.

Teachers were at first hesitant to adopt computer assisted instruction into their classes, according to principal Lou Price. Some were intimidated by the unfamiliar teaching mode, and others were skeptical about its use with severely and profoundly handicapped students. To overcome the staff's lack of experience with computer assisted instruction, a CAI coordinator works closely with teachers and students to adapt hardware and software for the special population of students at Northwest Louisiana. Teachers also attend a statewide in-service training program offered through the Special School District #1. After six months of using computer assisted instruction, and with the encouragement and support of principal Lou Price, teachers are becoming more enthusiastic about its benefits. They have watched students accomplish tasks that previously had seemed impossible. Behavior problems have diminished as students look forward to working on the computer. For many severely handicapped students, computer games are the first recreational activity they have been able to engage in. According to Ms. Price, computer assisted instruction has the potential to improve her student's vocational and independent living skills, eventually allowing some students to leave the institutional setting.

Although the CAI program can be expensive to implement, Price emphasized that community resources exist, but are often overlooked by school systems. For example, a local retiree with computer expertise has built handmade switches for the school, saving the program the cost of buying expensive adaptive devices. She also mentioned the cost effectiveness of increased cooperation among state agencies. Vocational-Technical students, for example, could produce the adaptive hardware for the CAI program.

The experience of Special School District #1 has shown that technological innovations can expand the range of activities open to emotionally and physically handicapped students. Because of the patient, non-threatening, and individualized attention which computers offer special needs students, they create a more positive attitude about learning among students who are accustomed to academic failure. For students with severe physical handicaps such as cerebal palsy, CAI's computer games provides a chance to play, which relieves tension and reduces behavioral problems. According to John Guilbeau, CAI has opened up new worlds of communication for special needs students, and allowed teachers to see new potential in students whose abilities had been imprisoned within their handicaps.

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Houston, Texas--Districtwide Commitment to Computer Literacy

In 1981, the Houston Independent School District (HISD) established a Department of Technology which since that time has placed the district at the forefront of computer use in the public schools. In its first year of operation (1981-82), the Department's budget of $3.4 million included $931,667 for salaries and more than $2 million for the purchase of microcomputers and other equipment. Its budget has since grown to almost $7.7 million for the 1985-86 school year. Of the total funds budgeted, $5.2 million (68%) are federal, with $4.2 million going directly to the schools for the purchase of equipment, supplies, and services. Local funds comprise 26 percent of the budget, and state compensatory funds make up the remaining 6%.

Because the HISD is convinced that its students' education must keep pace with the technological innovations around them, they have adopted a long-range, coordinated approach to integrating computer use into their curriculum. To reduce costs and ensure compatibility among the more than 100 campuses, the HISD has centralized the evaluation and purchase of both hardware and software programs. Centralized purchasing has resulted in significant savings, while standardization facilitates the Department's training programs for its personnel.

Recognizing the critical role of teacher and administrator acceptance and understanding of computer use in the classroom, the Department of Technology holds orientations, workshops, and hands-on classes for 1500 staff members per month. HISD has also created a Teacher Technologist Training Program as a means of "diffusing change quickly throughout a large school district." Teacher Technologists receive 296 hours of intensive training in programming techniques and administrative and classroom applications. According to Pat Sturdivant, Deputy Superintendent of Technology, "as change agents, the Teacher Technologists have given the campus-level presence needed to inspire students and other educators to investigate what technology can do." Although only teachers already in the system have thus far completed the Teacher Technologist Training Program, the opportunity for this degree of technology training and the pay incentives which are offered are also intended as an inducement to talented teachers to come to the Houston Independent School District. This will be an increasingly important goal of the program, giving Houston an edge in recruiting the short supply of qualified math and science teachers.

The HISD serves a population which is 77 percent minority, with a growing number of Hispanic (30%) and Asian (3%) students. One of its main goals, therefore, has been insuring access to technology for all of its students, particularly the disadvantaged. Parent involvement is considered an essential element in achieving educational equity for minority and low income students. The Computers Can program is designed to make computers more accessible to low-income families, and to encourage parents to take a more active role in teaching their children basic skills. After receiving 12 hours of training, parents can check out microcomputers for home use. The training sessions are held in the late afternoon or evenings, and discussions are in both English and Spanish. So far, parent response has been enthusiastic, and the program was expanded in 1985-86 to include 113 campuses, supplied with 850 computers available for check-out. Software

programs are also available to parents on a check-out basis through a lending library that houses over 4000 titles. Through a program called Compu-Buy, parents and teachers can purchase a high quality microcomputer at the district's discounted price.

Another method for insuring that low income and minority students have access to computer use is to offer these students extended day and summer programs that feature computer training and use. The district offers computer camps free of charge during the summer to low income students. In orientation sessions, teachers and administrators are alerted to the under-representation of girls, minorities, and low income students in computer classes so that special attention will be given to including these students through encouragement and special scheduling efforts.

Because of the ethnic mix of Houston's population, the HISD has 34,000 students identified as having limited English proficiency. Finding enough teachers to offer English as a Second Language (ESL) has therefore been a hard task for the HISD. The solution of the Department of Technology was to develop a software program for teaching ESL. This tutorial program takes advantage of recent breakthroughs in digital technology, which allow the incorporation of actual human speech into instructional software. The software development team in the Department of Technology, a group of programmers, systems analysts, writers, graphics specialists, and instructional design specialists. In addition to the ESL program, which is now being marketed nationally, the team has also produced a word processing program which HISD anticipates will save more than a million dollars over a three year period by circumventing the purchase of thousands of copies of a commercial word processing program.

Compared with most school systems, Houston is far advanced in its incorporation of technology into the classroom. "Education is change and the way we educate is changing because of societal changes," says a Department of Technology press release. The Houston Independent School District is firmly committed to preparing all of its students for the rapid technological advances occurring in the workplace. As of 1986, each high school senior must meet a "computer literacy" requirement in order to graduate. A computer literate student is defined as one who has "the knowledge, skills and attitudes necessary for functioning in a computer-oriented society." The objective of computer literacy is not to make every child into a computer programmer, but rather to enable each child to be aware of and take advantage of the many computer applications now available.

The HISD's high level of commitment to the goal of educating their students for a technologically advanced society is indicated by its creation of a special Department of Technology, by its emphasis on teacher and administrative training, by its attention to parental involvement, by its efforts to ensure accessiblity to low income and minority students, by its development of its own instructional software, and by its adoption of long-range but flexible planning strategies to expand and change programs while keeping a lid on costs. The Houston School District can serve as a comprehensive model to inspire other Southern school districts to develop systemwide programs which promote the creative use of computer technology in the classroom.

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CONCLUSION

Technological changes in education, as in any field, present educators both with unprecedented opportunities and with substantial risks. As the four models presented here demonstrate, advances in telecommunications and computer hardware and software can be used to great advantage by school systems. Through new telecommunications technologies, remote rural areas can offer sophisticated courses that better prepare students for higher education or the work world. Special needs students, using specially adapted microcomputers, can boost their self-esteem and improve their leisure and learning skills. Students, including girls, minorities and those from disadvantaged families, can use microcomputers to develop higher order thinking skills. Parents who have never been involved with their child's school or been able to help with homework can learn computer skills and take a more active role in their child's education.

On the risk side, introducing technology into the classroom can be costly, can alienate teaching staff, can widen the gap between advantaged and disadvantaged students. As the four model programs illustrate, the successful use of educational technology requires careful, long-range planning on the part of school districts to prevent these negative outcomes.

Before the hardware is in place, teachers and admnistrators must determine the goals and objectives of their program. One explicit goal should be to promote equal access to technology for all of a district's students. Administrators must also consider how and by whom software will be evaluated, devise creative measures to cut costs and raise funds for purchase of equipment and software, and design a system for ongoing teacher training. Smaller, less affluent districts must consider cooperation with other districts and with local universities and other non-profit institutions that can provide the financial and personnel resources that a single district could not afford. And plans to increase the involvement of parents and the community should be developed.

The educational implications of technology are as yet unrealized and largely unknown. There is plenty of room for experimentation and innovation. School systems in the South, if they decide to, can be on the leading edge of developing effective curricula that rely on microcomputers, teleconferencing, and other new technologies. Their students, the future workers, parents, and leaders in the South, will be the beneficiaries.

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Corporate Associates

A.B.C. Liquors, Inc.
American Ship Building Company
Arkansas Louisiana Gas Company
Arvida Disney Corporation
Atlantic Research Corporation
Bank of Virginia
Bankers Trust of South Carolina
Baxter-Travenol Laboratories
Blossman Gas, Inc.
Bowater, Inc.
Broyhill Foundation Incorporated
CSI Group, Inc.
CSX Corporation
Campbell Soup Company
Cardinal Industries, Inc.
Chem-Nuclear Systems, Inc.
Chevron, U.S.A., Inc.
Citizens & Southern National Bank
(The) Coca Cola Company
Colonial Life & Accident Insurance Company
Contel Corporation
Daniel International Corp.
Delta Air Lines, Inc.
Deposit Guaranty National Bank
E.I. du Pont de Nemours & Company
Ergon, Inc.
First American Corporation
First Atlanta Corporation
First Union National Bank
Freeport-McMoran, Inc.
Georgia Power Company
Great Northern Nekoosa Foundation, Inc.
HCA The Healthcare Company
Hancock Bank
Hughes Eastern Petroleum, Ltd.
J.P. Stevens & Company, Inc.
Jockey International, Inc.
Johnson & Johnson
Lowe's Charitable & Educational Foundation
Maybelline Company
McCarty Farms, Inc.
Mississippi Power Company
Mobile Communications Corp. of America
Munro Petroleum & Terminal Corporation
Norfolk Southern Foundation
Oklahoma Gas & Electric Company
Piedmont Natural Gas
Richmond, Fredericksburg and Potomac Railroad Co.
Ruddick Corporation
Ryder Systems, Inc.
Sears, Roebuck & Company
Sinclair Oil Company
Sonoco Foundation
South Carolina Electric & Gas
Southern Bank
Southwestern Bell Telephone Co.
Springs Industries
Tampa Electric Company
The Liberty Corporation
The Southland Corporation
The State-Record Company
The Telex Corporation
Transgulf Pipeline Company
Union Camp Corporation
Universal Leaf Tobacco Co., Inc.
Vulcan Materials Company

Non-profit Associates

Alabama Commission on Higher Education
Alabama Foreign Trade Relations Commission
Alcorn State University
Appalachian State University
Arkansas College
Arkansas State University
Arkansas Tech University
Auburn University
Auburn University at Montgomery
Augusta College
Barren River Area Development District
Blue Cross/Blue Shield
Bluegrass Area Development District, Inc.
Broward Community College
Business Council of Georgia
Campbell University
Central Midlands Regional Planning Council
Charleston Trident Chamber of Commerce
Chowan College
(The) Citadel
Clemson University
Clemson University/RRDI
Cobb County Chamber of Commerce
Community Development Foundation
Consolidated Healthcare, Inc.
Dalton-Whitfield Chamber of Commerce
Daytona Beach Community College
Denmark Technical College
East Arkansas Community College
East Arkansas Planning & Development District
East Carolina University Regional Development Center
Elizabeth City State University
Florida A&M University
Florida Southern College
Florida State University

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Non-profit Associates (cont'd.)

Fort Valley State College Extension Program (1890)
Garland County Community College
Gaston County Economic Development Commission
Gateway Area Development District
George C. Wallace Community College
Georgia Institute of Technology
Georgia Mountains Planning & Development Commission
Georgia Ports Authority
Governors' Center, Duke University
Greater Columbia Chamber of Commerce
Greater Greenville Chamber of Commerce
Greater Macon Chamber of Commerce
Greater Raleigh Chamber of Commerce
Gulf South Research Institute
Hardy Harris Foundation
Henderson State University
Hendrix College
Industrial Developers of Arkansas
International Business Council
Itawamba Junior College
Jacksonville State University
Jefferson State Junior College
Kennesaw College
Kentuckiana Regional Planning & Development District
Kentucky River, A.D.D.
Lake Cumberland Area Development District, Inc.
Lenoir-Rhyne College
Livingston University
Louisiana Public Facilities Authority
Louisiana State University
MDC, Inc.
Magnolia State Foundation
Memphis State University
Meridian Junior College
Metropolitan Tulsa Chamber of Commerce
Miami-Dade Community College
Microelectronics Center of North Carolina
Midlands Technical College
Mississippi Delta Junior College
Morris College
North Arkansas Community College
North Carolina Central University
North Carolina Japan Center
North Carolina State University
Northwest Louisiana State University
Northern Kentucky University
Northern Kentucky Area Development District
Nova University
Old Dominion University
Palm Beach Atlantic College
Pennyrile Area Development District
Pensacola Junior College
Phillips County Community College
Port of Lake Charles
Port of New Orleans
Queens College
Santee-Lynches Council of Governments
SE Arkansas Economic Development District, Inc.
SW Arkansas Planning & Development District
Shreveport Chamber of Commerce
South Carolina Ports Authority
Southern Arkansas University
Southern Forest Institute
Southern Group of State Foresters
Southern Rural Development Center
Southern Technical Institute
Spartanburg Area Chamber of Commerce
State of Alabama Community Colleges
Trident Technical College
Tulane University
Tulane University-External Affairs
University of Alabama - Birmingham
University of Alabama, Department of External Affairs
University of Alabama System
University of Arkansas-Fayetteville
University of Arkansas-Little Rock
University of Arkansas-Research and Public Service
University of Central Arkansas
University of Central Florida
University of Georgia
University of Louisville
University of Miami
University of Montevallo
University of South Carolina
University of Southern Alabama
University of Southern Mississippi
University of South Florida
Upper Savannah Council of Governments
USC Coastal Carolina College
Virginia Polytechnic Institute
Westark Community College
West Central Arkansas Planning & Development District
West Virginia Business Roundtable
Western Kentucky University

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